

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the application:

Listing of Claims:

Claims 1-28 (canceled).

29. (currently amended): A multipass method for cutting of thick sections of cement-based materials, the method comprising the steps of:

mutually traversing a surface to be cut with [a] an unfocused laser beam at a power density sufficient to produce a depth of molten material having a maximum depth of 10 mm at each traverse;

allowing said molten material to solidify; breaking said solidified material into particles; and

removing said particles by suction means.

Claims 30 and 31 (canceled)

32. (previously presented): A method according to claim 29 wherein the laser beam is a parallel beam.

33. (previously presented): A method according to claim 29 wherein the laser beam has a rectangular cross section.

34. (previously presented): A method according to claim 29 wherein the material is removed directly after solidification after each pass.

35. (previously presented): A method according to claim 29 wherein the solidified material is broken up by a hollow crushing tube which also serves as a material extractor conduit.

36. (previously presented): A method according to claim 29 wherein the depth of the molten material at each pass lies in the range from 0.5 to 5 mm.

37. (previously presented): A method according to claim 29 wherein the pressure required for crushing the solidified material is less than 100 MPa.

38. (previously presented): A method according to claim 29 wherein the laser power density lies in the range 300 W.cm^{-2} to 3000 W.cm^{-2} .

39. (previously presented): A method according to claim 29 wherein the beam traverse speed lies between 3 cm.min^{-1} and 30 cm.min^{-1} .

Claims 40 to 42 (canceled)

43. (previously presented): A method according to claim 29 wherein the material removal rate lies in the region of $150 \text{ cm}^{-3}.\text{kWh}^{-1}$ for a diode laser and $100 \text{ cm}^{-3}.\text{kWh}^{-1}$ for a CO₂ laser.

Claims 44 and 45 (canceled)

46. (previously presented): A method according to claim 29 wherein the laser beam is delivered by a mobile beam delivery system comprising a system of reflecting mirrors.

47. (previously presented): An apparatus for cutting thick sections of cement-based materials in which material is made molten and allowed to solidify, the apparatus comprising a means for mutually traversing a surface to be cut with an unfocused laser beam at a power density sufficient to produce a depth of molten material having a maximum depth of 10 mm at each traverse;

a means for breaking the solidified material into particles; and

a suction means for removing the particles.

48. (previously presented): An apparatus according to claim 47 wherein the means for breaking re-solidified material comprises a percussive member for crushing the material.

49. (previously presented): An apparatus according to claim 48 wherein the percussive member is hollow and crushed material is removed through the member by suction means.

50. (previously presented): An apparatus according to claim 47 wherein the laser beam is substantially parallel.

Claim 51 (canceled)

52. (new): A multipass method for cutting of thick sections of cement-based materials, the method comprising the steps of:

mutually traversing a surface to be cut with an unfocused laser beam at a power density sufficient to produce a depth of molten material having a maximum depth of 10 mm at each traverse; wherein material is removed by the laser beam at a rate in the region of $150 \text{ cm}^{-3} \cdot \text{kWh}^{-1}$ for a diode laser and $100 \text{ cm}^{-3} \cdot \text{kWh}^{-1}$ for a CO₂ laser; and wherein the laser power density lies in the range 300 W.cm^{-2} to 3000 W.cm^{-2}

allowing said molten material to solidify; breaking said solidified material into particles; and

removing said particles by suction means.